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IS 11013 (1984): Piezoelectric Ceramic Elements (Impact Type and Squeeze Type) For Gas Lighters [LITD 5: Semiconductor and Other Electronic Components and Devices]



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“Knowledge is such a treasure which cannot be stolen”

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IS : 11013 - 1984

(Reaffirmed 2006)

Indian Standard

**SPECIFICATION FOR
PIEZOELECTRIC CERAMIC ELEMENTS
(IMPACT TYPE AND SQUEEZE TYPE)
FOR GAS LIGHTERS**

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR PIEZOELECTRIC CERAMIC ELEMENTS (IMPACT TYPE AND SQUEEZE TYPE) FOR GAS LIGHTERS

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Indian Standard

SPECIFICATION FOR PIEZOELECTRIC CERAMIC ELEMENTS (IMPACT TYPE AND SQUEEZE TYPE) FOR GAS LIGHTERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 September 1984, after the draft finalized by the Piezoelectric Devices for Frequency Control and Selection Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 This standard covers piezoelectric ceramic elements used in gas lighters. The requirements for piezoelectric ceramic materials are covered in IS : 11014 (Part 1)-1984*.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard deals with the requirements and methods of tests of piezoelectric ceramic elements for electronic gas lighters of the following types:

- a) Impact type, and
- b) Squeeze type.

2. TERMINOLOGY

2.1 For the purpose of this standard, the terms and definitions given in IS : 1885 (Part 44)-1978‡ and IS : 11014 (Part I)-1984* shall apply.

*Specification for piezoelectric ceramic materials: Part I General aspects and methods of measurements.

†Rules for rounding off numerical values (*revised*).

‡Electrotechnical vocabulary: Part 44 Piezoelectric devices.

3. CERAMIC MATERIALS

3.1 For the purpose of guidance ceramic materials used in the manufacture of elements for gas lighters are given below:

Type of Gas Lighters

Impact type

Squeeze type

Type of Ceramic Materials

Type 5 } IS : 11014

Type 4 } (Part 1)-1984*

4. SIZES OF PIEZOELECTRIC CERAMIC ELEMENTS FOR GAS LIGHTERS

4.1 The dimensions of piezoelectric ceramic elements generally used in gas lighters are given in Table 2.

4.2 The plane faces of the rods shall be parallel within a tolerance of 0.01 mm.

5. MARKING

5.1 Each piezoelectric ceramic element shall be marked with a sign of (+) or a dot on the electrode surface which had positive potential during poling.

5.2 The piezoelectric ceramic element may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. CLASSIFICATION OF TESTS

6.1 Type Tests — The procedure for type tests shall be in accordance with IS : 2612-1965†.

6.1.1 Number of Samples — The number of samples for type tests shall be 12 (twelve) of same lot unless otherwise stated in the relevant specification.

*Specification for piezoelectric ceramic materials: Part 1 General aspects and methods of measurements.

†Recommendations for type approval and sampling procedures for electronic components.

6.1.2 Sequence of Type Tests — The sequence of type tests shall be as given below:

- a) Visual examination (*see* 7.1),
- b) Dimensions (*see* 7.2),
- c) Capacitance (*see* 8.1), and
- d) Output voltage (*see* 8.2).

NOTE — All the samples shall be tested for each test.

6.2 Routine Tests — The following tests shall constitute routine tests and shall be carried out on every piezoelectric ceramic element:

- a) Visual examination (*see* 7.1), and
- b) Capacitance (*see* 8.1).

6.3 Acceptance Tests — Acceptance tests shall be carried out on a limited number of samples selected in accordance with IS : 2612-1965* from the lot which has been subjected to and satisfactorily completed the routine tests specified in 6.2.

Two groups of samples one for non-destructive tests (Group A) and another for destructive tests (Group B) shall be selected (*see* Appendix B of IS : 2612-1965*) and the elements in each group shall be subjected to the tests given in Table 1.

TABLE 1 ACCEPTANCE TESTS

Sl. No.	TEST	CLAUSe NUMBER	AQL (PERCENT EFFECTIVE)	*INSPECTION LEVEL (IS : 10673- 1983*)	N/D†
(1)	(2)	(3)	(4)	(5)	(6)
i)	Visual examination	7.1	1	II	N
ii)	Output voltage	8.2			

NOTE — Samples which have been subjected to destructive tests shall not be returned to the lot.

*Sampling plans and procedures for inspection by attributes for electronic items.

†N for non-destructive and D for destructive.

7. GENERAL TESTS

7.1 Visual Examination — The piezoelectric ceramic elements shall be checked visually for finish condition in accordance with the applicable

*Recommendation for type approval and sampling procedures for electronic components.

requirement. No chipping of edges and pits on the electroded surface is allowed. Marking shall be legible and indelible.

7.2 Dimensions — The dimensions shall be checked for those specified by the manufacturers (*see also 4.1*). The tolerance on diameter and length shall be ± 0.1 and ± 0.2 mm, respectively.

8. ELECTRICAL TESTS

8.1 Electrostatic Capacity (Capacitance) — The capacitance shall be measured by LCR bridge at 1 kHz. The dielectric constant shall be 1700 ± 20 percent for Type 5 and 1100 ± 20 percent Type 4 materials, which may be calculated from the capacitance and dimensions of the elements (*see Table 2*).

$$\text{Dielectric constant } K_{T3} = \frac{\text{capacitance} \times \text{thickness}}{\text{area} \times 8.85 \times 10^{-2}}$$

TABLE 2 CAPACITANCE AND DIMENSIONS OF ELEMENTS

(*Clauses 4.1 and 8.1*)

SL No.	DIAMETER	LENGTH	CAPACITANCE	
			Min	Max
(1)	(2)	(3)	(4)	(5)
	mm	mm	pF	pF
a) <i>Impact type</i>				
I	5.0	10.0	23.6	35.4
II	6.35	15.0	25.4	38.0
III	7.0	15.0	30.8	46.3
b) <i>Squeeze type</i>				
I	6.35	15.0	16.4	24.7
II	6.35	16.0	15.4	23.0

8.2 Output Voltage — The output voltage is determined by dropping a steel ball of 11.8 g (14 mm dia) from a height of 50 cm to the surface of capital of the cartridge which is set on the measuring equipment with its output terminal connected with a divider to divide output voltage. The output voltage is measured from the wave form on the CRT of oscilloscope with a frequency response dc to 50 MHz. The output voltage shall be more than 13 kV for impact type and 10 kV for squeeze type elements respectively.